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The Juno New Frontier Mission: Inside and Out

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In July 2016, after almost 5 years en route, NASA's Juno spacecraft will be inserted into polar orbit about Jupiter to begin a two-year mission of discovery unlike any that preceded it. Juno's orbit is a high inclination "mapping" orbit, designed to pass from just above the cloudtops at perijove to the distant magnetosphere (>40 Rj) at apojove. This orbit serves the study of Jupiter's origin, interior structure, and deep atmosphere, via global measurements of gravity, magnetic fields, and atmospheric composition to great depth; it also provides the first comprehensive in-situ observations of the polar magnetosphere and auroral regions. The re-planned Juno mission profile provides a months-long approach phase from the dawn side of Jupiter's magnetosphere, facilitating a study of upstream phenomena and the response of the aurora to solar wind drivers. Two 53-day capture orbits, also near dawn local time, follow orbit insertion (July 4) and provide an opportunity to characterize the distant magnetosphere and magnetosheath. If all goes as planned during the first few perijoves, another maneuver will reduce Juno's orbit period to 14 days, providing a set of at least thirty two 14-day science orbits with the spacecraft flying over Jupiter's poles and ducking under the radiation belts. The payload consists of a set of microwave antennas for sounding the deep atmosphere, magnetometers, gravity radio science, low and high energy charged particle detectors, electric and magnetic field radio and plasma wave experiment, ultraviolet imaging spectrograph, infrared imager and a visible camera. Juno's measurements of the abundance of Oxygen and Nitrogen in Jupiter's atmosphere, and the detailed maps of Jupiter's gravity and magnetic field structure will constrain theories of early planetary development. The Juno mission design, science goals, and measurements related to the origin of Jupiter will be presented.